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ABSTRACT

Effects of generating hunches upon subsequent search activities in problem solving situations were studied among 45 students, 9-11 years of age. The population, divided into three groups, was assigned to observe a contradictory stimulus. The first group was asked to write hunches, while the second was allowed to read a set of hunches. Hunch activities were not carried out among the control group. All subjects were required to classify a set of procedures as "useful" or "not-useful," relative to the contradictory event. Each student was given the materials and procedures described as useful in his own classification. A posttest was given to measure the quality of the solution formulated. The overall time for completing search activities was recorded. Analyses of findings showed the presence of direct influences of generating hunches on search behavior and quality of solutions. The first group classified significantly fewer procedures as useful, spent significantly more time in search, and demonstrated a significantly higher quality. No significant differences were found between the control and the second experimental groups. Implications of the present research for curriculum design and teacher training were recommended. (CC)

AN INVESTIGATION INTO THE EFFECTS OF GENERATING HUNCHES UPON SUBSEQUENT SEARCH ACTIVITIES IN PROBLEM SOLVING SITUATIONS

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Contemporary models for problem solving activity need to reflect the spontaneity and originality associated with the search for solutions and explanations. However, many attempts to describe problem solving have focused only upon the steps of problem solving rather than the evoked processes related to search and analysis.

Problem solving, as an activity, implies that a situation is observed for which no known or acceptable explanation exists for the observer. Hence, the observation of the situation, contradicts prior experience and initiates a search. As part of the search behavior, observers tentatively identify factors as possible causes for contradictory situation. This behavior will be defined here as generating hunches and is credited by many contemporary scientists with a facilitative effect on problem solving (Henderson, 1957; Benard, 1957; Hadamand, 1945; Shockley and McDonald, 1964).

The process of generating hunches can be the result of free-association, recall, or induction of classification, relationships, or tentative causes for observations. However, a second process, evaluation and rejection, seems to be coupled with hunch generation. "It came to me in a flash" is probably a true description of hunch generation, but probably 999 flashes were irrelevant and dismissed as absurd (Mechner, 1965). Discrimination between absurditities and insightfulness often

makes the difference between successful and unsuccessful problem solving.

The object of this study was to investigate the effect that generating hunches had upon subsequent search activities in problem solving situations. In particular, the following questions were of primary concern:

(1) Does hunch generation effect the number of procedures the observer tries?

(2) Is there a relationship between the generation of hunches and the quality of the solution selected for presented problems?

Methods and techniques:

Forty-five students, ages nine through eleven, were randomly assigned to three groups. Each group first observed a contradictory stimulus event. Experimental group one then wrote hunches while experimental group two read a set of hunches provided. The control group performed no hunch activity. All three groups then were required to classify a set of procedures as "useful" or "not-useful", relative to the contradictory event. Each pupil was then given the materials and procedures he classified as useful. Following this activity, all pupils completed a second measure consisting of a post-test of the quality of the solution formulated. The over-all time for completing the search activity was also recorded.

Data Sources:

The independent variables in this study were pupil generated hunches or pupil read hunches. Two dependent variables were

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Data Sources:

The independent variables in this study were pupil generated hunches or pupil read hunches. Two dependent variables were

measured: pupil classification of procedures as "useful" or "non-useful" for finding a solution to the experimental question, and the pupil's ability to modify a situation in order to solve a problem similar to the experimental problem. These variables were then computed by counting the "useful" responses and the number of modifications pupils made in order to solve the problem. Interrater agreement when necessary on the reliability of the measures was computed by percent agreement and was approximately .8.

Results and conclusions:

ANOV and Tukey's test of "Honestly Significant Differences" were performed and means and standard deviations computed, as reported in Table I. The findings of the study supported the notion that generating hunches directly influenced the search behavior initiated by the novel context of the stimulus event as well as the quality of the solution formulated. Subjects who wrote hunches classified significantly fewer procedures as "useful" ($p. < .05$), spent significantly ($p < .05$) more time in the search activity, and demonstrated a significantly ($p < .05$) higher quality of solution formulated. No significant differences were found between the group that read hunches and the control group.

Significance:

Discovery and problem solving activities place most of the selection of what is learned under the control of the learner. However, in terms of the social value of what learners need to learn, some external control seems necessary. By structuring the stimulus events and arranging the learning conditions so

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that hunches are generated, the teacher can influence the search activity and the quality of the solution formulated.

Although research findings of this type are tentative and require continued exploration, their implications for curriculum design and teacher training in science are of major importance.

TABLE I

SUMMARY OF MEANS AND STANDARD DEVIATIONS FOR DEPENDENT MEASURES OF TREATMENT

	Wrote Hunches		Read Hunches		No Hunches		F
	Mean:	S.D.:	Mean:	S.D.:	Mean:	S.D.:	
Choices classified correctly:	9.20	2.54	10.87	.618	10.33	1.075	3.820
Choices marked "yes":	7.00	1.79	8.931	1.81	8.86	1.75	5.319
% of "yes" choices correct:	63.90	16.87	72.50	9.12	68.72	6.13	1.924
Time to perform selected procedures:	71.26	6.67	63.80	8.09	63.79	8.09	4.448
Post-test score:	3.00	1.59	1.13	1.50	1.20	1.68	6.19

P(.05)=3.23 P(.01)=5.18 df=2,42

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TABLE II

ANOV AMONG DEPENDENT MEASURES

Choices Classified Correctly

	SS	DF	MS	F
Among	21.735	2	10.867	3.820
Within	119.467	42	2.844	

Choices marked as "Useful"

	SS	DF	MS	F
Among	36.136	2	18.068	5.319
Within	142.667	42	3.397	

Time to perform selected procedures:

	SS	DF	MS	F
Among	557.461	2	278.730	4.458
Within	2631.742	42	62.661	

Post-test score:

	SS	DF	MS	F
Among	33.644	2	16.822	6.190
Within	114.133	42	2.717	

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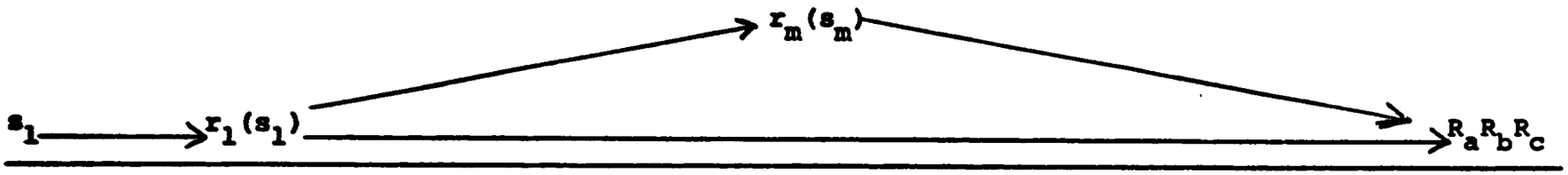
TABLE III

AN ANALYSIS OF HUNCH GENERATION IN A MULTIPROCESS MODEL OF LEARNING*



Stimulus Differentiation:	Associative Mediation:	Response Integration:
Study discrepant event.	Recall off associated experience.	Retain structure.
Review event in memory.	Generate a structure for associating functional stimulus components and prior experience.	Integrate prior experience and selected functional stimulus components.
Recognize event as discrepant.	Review coded components.	Generate verbal responses--hunches.
Recognize and name specific stimulus components.		
Select "important" stimulus components and code for memory.		

*(Melton, 1967)

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